

BAB V

KESIMPULAN

5.1. Kesimpulan

1. Formulasi ODT dimenhidrinat dengan teknik likuisolid menggunakan pelarut *non-volatile* dan bahan ko-proses dapat menghasilkan mutu fisik tablet yang sesuai dengan persyaratan, dimana parameter yang diuji meliputi kekerasan tablet, kerapuhan tablet, waktu hancur tablet, waktu pembasahan tablet, dan rasio absorpsi air.
2. Stabilitas mutu fisik ODT dimenhidrinat dengan teknik likuisolid dapat dikatakan relatif tidak stabil akan tetapi masih memenuhi persyaratan, sedangkan stabilitas untuk ODT dimenhidrinat tanpa teknik likuisolid dapat dikatakan relatif lebih stabil, dimana selama proses penyimpanan tidak terjadi perbedaan yang bermakna dari parameter uji mutu fisik tablet yang dilakukan.
3. Pada profil pelepasan *in vitro*, sediaan ODT dimenhidrinat dengan teknik likuisolid menunjukkan pelepasan obat yang lebih besar dibandingkan dengan ODT dimenhidrinat tanpa teknik likuisolid, namun masih jauh lebih kecil jika dibandingkan dengan tablet *innovator* dimenhidrinat.

5.2. Alur Penelitian Selanjutnya

1. Diharapkan ditemukan metode yang tepat untuk memperbaiki stabilitas sediaan ODT dimenhidrinat dengan teknik likuisolid sehingga sediaan tetap stabil selama proses penyimpanan.

2. Dilakukan penelitian lebih lanjut tentang interaksi yang mungkin terjadi antara laktosa monohidrat dengan propilen glikol yang digunakan sebagai pelarut *non-volatile*.
3. Dapat ditemukan formulasi yang lebih baik menggunakan eksipien tablet yang dapat meningkatkan pelepasan *in vitro* dimenhidrinat, sehingga nantinya akan lebih baik dibandingkan dengan tablet *innovator* dimenhidrinat.

DAFTAR PUSTAKA

- Abay, F.B. and Ugurlu, T. 2015, Orally Disintegrating Tablets: A Short Review, *Journal of Pharmaceutics & Drug Development*, **3(3)**: 1-8.
- Aliawati, G. 2003, Teknik Analisis Kadar Amilosa Dalam Beras. *Buletin Teknik Pertanian*. **8(2)**: 82-84.
- Ansel, H.C. 1989, *Pengantar Bentuk Sediaan Farmasi*, Diterjemahkan dari Bahasa Inggris oleh F.Ibrahim, Edisi IV, UI Press, Jakarta.
- Arofah, L. 2011. Diakses pada 1 November 2015, (<http://kebunpisang.com/wp-content/uploads/2012/01/pisang-agung-thumb.jpg>).
- Banakar, U.V. 1992, *Pharmaceutical Dissolution Testing*, Marcel Dekker Inc., New York.
- Banker, G.S. and Anderson, N.R. 1986, "Tablet" in Lachman, H.A, Lieberman, and Kanig, J.L., *The Theory and Practice of Industrial Pharmacy*, 3rd edition., Lea and Febiger, Philadelphia, pp. 259, 299, 316-329.
- Bhowmik, D., Chiranjib, B., Krishnakanth, Pankaj, and Chandira, R.M. 2009, Fast Dissolving Tablet: An Overview, *Journal of Chemical and Pharmaceutical Research*, **1(1)**: 163-177.
- Breitkreutz, J., Preis, M., and Pein, M. 2012, Development of a Taste-Masked Orosoluble Film Containing Dimenhydrinate, *Pharmaceutics*, **4**: 551-562.
- Chang, P.Y. 1999, Sulfites and Food in Francis, F.J, *Willey Encyclopedia of Food Science and Technology*, 2th edition. Wiley and Sons Inc, New York.
- Chougule, A.S., Dikpati, A., and Trimbake, T. 2012, Formulation Development Techniques of Co-processed Excipients, *Journal of Advanced Pharmaceutical Sciences*, **2(2)**: 231-249.
- Claus, E.P. and Taylor, V.E. 1965, *Pharmacognosy* 5th edition. Lea and Febiger, Philadelphia.
- Dalimarta, S., 2007, *Atlas Tumbuhan Obat Indonesia* Jilid Ketiga. Trubus Agriwidya, Jakarta.
- Departemen Kesehatan RI. 2014, *Farmakope Indonesia Edisi V*, Departemen Kesehatan Republik Indonesia, Jakarta.

Direktorat Jendral Pengawasan Obat dan Makanan Republik Indonesia (Ditjen POM RI), 2000, *Parameter Standar Umum Ekstrak Tumbuhan Obat*, Departemen Kesehatan Republik Indonesia, Jakarta.

Dressman, J. and Kramer, J. 2005, *Pharmaceutical Dissolution Testing*, Taylor & Francis, Boca Raton, p. 1.

European Pharmacopedia. 2005, Farmakope Eropa, ed. 5, Uppsala, Dewan Eropa, 2468.

Fierse, E.F. and Hagen, A.T. 1986, "Pre formulation" in Lachman, H.A., Lieberman, Kaning, J.L. *The Theory and Practice of Industrial Pharmacy*, 3rd edition, Lea and Febiger, Philadelphia, p. 183-184.

Forner, D.E., Anderson, G.S., Bunker, T.W. Risanske, and R.E.Gordon. 1981, Granulation and Tablet Characteristic in Lachman, L., Lieberman, H.A., and Schwartz, J.B., *Pharmaceutical Dosage Form*, 2nd ed., Marcel Dekker Inc, New York, 248-338.

Green, J. M. 1996, *A Practical Guide Analytical Method Validation*, Analytical Chemistry.

Gusnimar, A. 2003, Teknik Analisis Kadar Amilosa dalam Beras, *Buletin Teknik Pertanian* **8(2)**: 3-6.

Hadisoewignyo, L. dan Fudholi, A. 2013, *Sediaan Solida*, Pustaka Pelajar, Yogyakarta.

Hirani, J.J., Rathod, D.A., and Vadalia, K.R. 2009, Orally Disintegrating Tablets: A Review, *Tropical Journal of Pharmaceutical Research*, **8(2)**: 161-172.

Hsu, A.F., and C.H. Han, 2005, Oral Disintegrating Dosage Form, *US Patent Application Publication Number* 20050147670A1, 1-3.

Jain, C.P. and Naruka, P.S. 2009, Formulation and Evaluation of Fast Dissolving Tablets of Valsartan, *International Journal of Pharmacy and Pharmaceutical Sciences*, **1(1)**: 219-226.

Jadhav, Y.G., Galgatte, U.C., Chaudari, P.D. 2013, Estimation of Dimenhydrinate in Bulk and Pharmaceutical Dosage Form : Method Development and Validation, *Indo America Journal of Pharm Research*, **3(8)**: 7001-7007.

- Juliano, B.O. 1971, A Simplified Assay for Milled Rice Amylose Measurement, *Journal Of Cereal Sci. Today*, 16 : 334-336 **dalam**
- Gusnimar, A. 2003, Teknik Analisis Kadar Amilosa dalam Beras, *Buletin Teknik Pertanian* **8(2)**: 3-6.
- Karsono, Tanuwijaya, J., dan Fatma, D. 2014, Formulation of Ibuprofen Orally Disintegrating Tablets (ODTs) by Lyophilization Method using Gelatin and Mannitol, *International Journal of PharmTech Research*, **6(3)**: 996-1002.
- Khan, K.A. 1975, The Concept of Dissolving Efficiency, *Journal Pharm*, **27(1)**: 48-49.
- Langenbuchner, F. 1972, Linierzation of Disolution Rate Curve by Weibull Distribution, *J. Pharm. Pharmac*, **24**: 972-981.
- Manogar, P.G., Hari, B.N.V, and Devi, D.R. 2011, Emerging Liquisolid Compact Technology for Solubility Enhancement of BCS Class-II Drug, *Journal of Pharmaceutical Sciences and Research*, **3(12)**: 1604-1611.
- McEvoy, G.K. 2011, *AHFS Drug Information Essensial*, American Society of Health System Pharmacists, Bethesda, 523.
- Meyer, L.H. 1960, Chemistry Reinhold Publishing Corporation, New York **dalam** Mulyandari, S.H. 1992, ‘Kajian Perbandingan Sifat-Sifat Pati Umbi-Umbian dan Pati Biji-Bijian’, *Skripsi*, IPB, Bogor.
- Mohamed, M.B., Talari, M.K., Tripathy, M., Majeed, A.B.A. 2012, Pharmaceutical Applications of Crospovidone : A Review, *International Journal of Drug Formulation and Research*, **3(1)**: 13-28.
- Mulyandari, S.H. 1992, Kajian Perbandingan Sifat-Sifat Pati Umbi-Umbian dan Pati Biji-Bijian. *Skripsi*. IPB, Bogor.
- Munadjim. 1983. *Teknologi Pengolahan Pisang*. Gramedia Pustaka Utama, Jakarta.
- Nagar, P., Singh, K., Chauhan, I., Verma, M., Yasir, M., Khan, A., Sharma, R., and Gupta, N. 2011, Orally Disintegrating Tablets : Formulation, Preparation Techniques and Evaluation, *Journal of Applied Pharmaceutical Science*, **1(4)**: 35-45.

- Nazal, S., Zaghloul, A.Z., and Khan, M.A. 2002, Effect of Extragranular Microcrystalline Cellulose on Compaction, Surface Roughness and In Vitro Dissolution of a Self-Nanoemulsified Solid Dosage Form of Ubiquinone, *Pharmaceutical Technology*, 86-98.
- Parrott, E.L. 1971, *Pharmaceutical Technology Fundamental Pharmaceutics*, 3rd ed., Burgess Publishing Company, Minneapolis.
- Peera, N.H., Lohithasu, D., Sahoo, S.K., Naidu, M.S., Kumar, K.M., and Kumar, V.A. 2013, Formulation development and evaluation of oral disintegrating tablets of zolmitriptan, *Scholars Research Library*, **5(2)**: 324-332.
- Prajapati, B.G. and Patel, S.N. 2010, Formulation, Evaluation and Optimization of Orally Disintegrating Tablet of Cinnarizine, *e - Journal of Science & Technology (e-JST)*, **5(5)**: 9-21.
- Prahardini, P.E.R., Yuniarti, dan Krismawati, A. 2010, Karakteristik Varietas Unggul Pisang Mas Kirana dan Agung Semeru Kabupaten Lumajang, *Buletin Plasma Nutfah*. **16(2)**: 126-133.
- Pusapati, R.T., Kumar, M.V.R.K, Rapeti, S.S., and Murthy, T.E.G.K. 2014, Development of co- processed excipients in the design and evaluation of atorvastatin calcium tablets by direct compression method, *International Journal of Pharmaceutical Investigation*, **4(2)**: 102-106.
- Rahman, F. 2007, ‘Pengaruh Konsentrasi Natrium Metabisulfit ($\text{Na}_2\text{S}_2\text{O}_5$) dan Suhu Pengeringan Terhadap Mutu pati Biji Alpukat (*Parsea Americana mill.*)’, *Skripsi*, Sarjana Fakultas Pertanian, Universitas Sumatra Utara, Medan, 23.
- Rao, A. S. and Aparna, T. N. 2011, Liquisolid Technology: An Overview, *International Journal of Research in Pharmaceutical and Biomedical Sciences*, **2(2)**: 401-409.
- Rane, D.R., Gulve,H.N., Patil, V.V., Thakare, V.M., and Patil, V.R. 2012, Formulation and Evaluation of Fast Dissolving Tablet of Albendazole, *International Current Pharmaceutical Journal*, **1(10)**: 311-316.
- Reddy, M.N.K., Hussain, M.A., Rao, T.R., Kishna, T.R., and Pavani, K. 2012, Formulation and Evaluation of Naproxen Oral Disintegrating Tablets, *International Journal of Pharmacy and Biological Sciences*, **2(2)**: 303-316.

- Robo, A.C.D. 2014. ‘Optimasi Bahan Ko-Proses ODT Menggunakan Amilum Kulit Pisang Sebagai Pengikat, Crosspovidone Sebagai Superdisintegrant dan Avicel PH 101-Laktosa Monohidrat Sebagai Pengisi’, *Skripsi*, Sarjana Farmasi, Universitas Katolik Widya Mandala, Surabaya.
- Rowe, R.C., Paul, J.S., and Marian, E.Q. 2006. *Handbook of Pharmaceutical Excipients*. Fifth Edition. Pharmceutical Press. USA.
- Rowe, R.C., Paul, J.S., and Marian, E.Q. 2009. *Handbook of Pharmaceutical Excipients*. Sixth Edition. Pharmceutical Press. USA.
- Sa`adah, H. dan Fudholi, A. 2011, Optimasi Formula Tablet Teofilin Menggunakan *Co-Processed Excipients* Campuran Laktosa dan Avicel, *Majalah Farmasi Indonesia*, **4(22)**: 306-314.
- Sanjay, P.D., Deepak, M., and Bhanudas, S.R. 2013, Liquisolid Technology: Technique for Formulation with Enhanced Bioavailability, *World Journal of Pharmacy and Pharmaceutical Sciences*, **3(1)**: 368-387.
- Satuhu, S., B. Sc. dan A. Supriyadi. 1991, *Pisang Budidaya, Pengelolaan dan Prospek Pasar*, Penerbit Swadaya, Jakarta.
- Shargel, L. and Yu, A.B.C. 1999, *Applied Biopharmaceutical and Pharmacokinetics*, 4th ed. McGraw-Hill. New York.
- Siddiqui, M.N., Garg, G., and Sharma, P.K. 2010, Fast Dissolving Tablets: Preparation, Characterization and Evaluation: An Overview, *International Journal of Pharmaceutical Sciences Review and Research*, **4(2)**: 87-96.
- Siregar, C.J.P. 2010, *Teknologi Farmasi Sediaan Tablet: Dasar-dasar Praktis*, EGC, Jakarta.
- Stasiak,M., Molenda,M., Opalinsko,I., Blaszcak,W. 2013, Mechanical Properties of Native Maize, Wheat and Potato Starches, *Czech Journal Food Science*, **31(4)**: 349.
- Sunarjono, H. 2004, *Budidaya Pisang dengan Bibit Kultur Jaringan*, Penerbit Swadaya, Jakarta.

- Suryani, N., Musdja, M.Y., dan Suhartini, A. 2013, ‘Penggunaan Amilum Umbi Suweg (*Amorphophallus campanulatus Bi Decne*) Sebagai Pengikat Tablet Ibuprofen dengan Metode Granulasi Basah’, Fakultas Farmasi UIN Syarif Hidayatullah. *Prosiding Seminar Nasional Perkembangan Terkini Sains Farmasi dan Klinis III*. 122-127.
- Swanbrick, J., 2007, *Encyclopedia of Pharmaceutical Technology*, Third Edition, Informa Healthcare Inc., USA.
- Syed, I.A. and Pavani, E. 2012, The Liquisolid Technique: Based Drug Delivery System, *International Journal of Pharmaceutical Sciences and Drug Research*, **4(2)**: 88-96.
- Syukri, Y. 2010. ‘Potensi Amilum Lokal sebagai Eksipien dalam Formulasi Sediaan Tablet’, Universitas Islam Indonesia, *Seminar Nasional Farmasi, Indonesia*, 5-6.
- Tanuwijaya, J. and Karsono, 2013. The Effects of Crospovidone and Croscarmellose Sodium as Superdisintegrants On the Characteristics Of Piroxicam Nanoparticles ODT (Orally Disintegrating Tablet), *International Journal of PharmTech Research*, **5(4)**: 1590-1597.
- Velmurugan, S. and Vinushitha, S. 2010, Oral Disintegrating Tablets: An Overview, *International Journal of Chemical and Pharmaceutical Sciences*, **1(2)**: 1-12.
- Wagner, J.G. 1971, *Biopharmaceutics and Relevant Pharmacokinetics*, 1st ed., Drug Intelligence Publications, Illinois.
- Winarno, F.G. 2002, *Kimia angan dan Gizi*, Gramedia Pustaka Utama, Jakarta **dalam** Suryani, N., Musdja, M.Y., Suhartini, A., 2013, Penggunaan amilum umbi suweg (*Amorphophallus campanulatus B.I. Decne*) sebagai pengikat tablet ibuprofen dengan metode granulasi basah. *Prosiding Seminar Nasional Perkembangan Terkini Sains Farmasi dan Klinik III*, 123.
- Yapar, E.A. 2014, Orally Disintegrating Tablets: An Overview, *Journal of Applied Pharmaceutical Science*, **4(2)**: 118-125.